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## THE CONCENTRATION OF INDUSTRY, AND MACHINERY IN THE UNITED STATES.\*

Large industries in America show a strong tendency to concentration. The fact is one of familiar observation, while innumerable and incontestable proofs are to be found in statistics. The multiplication of the number and power of machines, the improvement of the means of transportation, the growth of capital are the three principal causes of this evolution. They are well known and need not be insisted upon.

I propose in this paper to direct attention to the part which the spirit of invention and the characteristics of the laboring classes have taken in this development, and to consider the attitude of the laboring classes and of the entrepreneur to the problems which this transformation has called forth. The inventive genius and the enterprising spirit of Americans are among the causes of the great development of machinery. A few years ago, Mr. Jacob Schoenhof said in his interesting volume upon "The Economy of High Wages,"†

"If one has made it an object to examine the tools and other automatic machinery and the working methods in the metal and machine industries of this country and has made parallel observations in Europe, he can hardly help speaking with admiration of the genius of our people, who, impelled by causes already discussed, have worked from the most difficult beginnings into fields never trodden before, where a tariff could hinder, but could never help."

There is no country where, in spite of the system of preliminary examination, more patents are applied for and granted than in the United States. In 1890 there were 41,048

\* This paper is an extract from one of the chapters of my work, "*L'ouvrier américain*," now in press.

† P. 224.

applications and 26,292 inventions.\* In the same year there were 7634 in France. From 1837 to 1895 there have been 950,855 applications for patents and 543,956 patents granted. Carriages, wagons, stoves, furnaces, reapers, lamps, and shoes have been the principal subjects of these inventions.

Patents do not always represent inventions peculiar to the United States, since many are imported. Americans are prompt to seize every novelty and like to believe that it is their own. The system of preliminary examination seems to give them greater security than the French system. They are none the less authors of many beautiful inventions, particularly in machinery and in electricity, where they properly are considered masters. They are also very prompt to take out a patent for the slightest appliance, if it is only to have it bought by others.†

The desire to diminish human effort by mechanical processes is shown in small as in large things. In the large dwellings and factories of recent construction, the elevator replaces the stairway; most merchants and many private persons conduct their correspondence by machinery. The use of the telephone is much more general than in France.

Two minor matters showed me at once on my arrival in New York, how widespread was the desire to save labor. I saw the tracks of a street railway being sanded. The wagon for this purpose contained, besides a driver, only one workman who held a lever, opening and closing a

\*The number has doubled in twenty years as seen by the following table:

PATENTS IN THE UNITED STATES.

Year.	Applications for Patents.	Patents Granted.
1850 . . . . .	2,193 . . . . .	993
1860 . . . . .	7,653 . . . . .	4,084
1870 . . . . .	19,171 . . . . .	13,333
1875 . . . . .	21,638 . . . . .	14,837
1880 . . . . .	23,012 . . . . .	13,947
1885 . . . . .	35,717 . . . . .	24,233
1890 . . . . .	41,048 . . . . .	26,292
1894 . . . . .	38,439 . . . . .	20,867

† See Atkinson, Tenth Census. Report on Cotton Manufactures, p. 10.

vent through which the sand flowed like water through a watering-pot. On the elevated railroad trains, where the stops are very brief, I observed that the brakeman held a lever which opened and closed the gates automatically. I was recently at Berne with an American, the inventor of an ingenious machine for the analytical tabulation of statistical bulletins. He was looking at a large wheel, which was turned by four men, like squirrels in a cage, for raising the material used in the erection of a large building, and could not conceal his astonishment. He was sorry he did not have a camera, "for," he said, "in America they would not believe me if I told them of it."

The American nation has great confidence in its inventive genius as well as in the superiority of its civilization. *L'Économiste Français* \* some time ago reproduced a passage from a mining journal of Montana, which, endeavoring to prove that the United States could adopt the free coinage of silver without the co-operation of Europe, said, "we are the first nation of the world. It is to our inventive genius that the world owes its steamboats, telegraphs and telephones. Without us Europe would return to the barbarism of the Middle Ages." This sentiment, which attests the national pride rather than the erudition of the author, is found very often in print and in conversation; discreetly among those who have studied or visited the Old World, boastfully in the mass of the people and in the newspapers, especially those of the far West. I remember having seen at the Exposition at Philadelphia in 1876, a picture in sixteen sections representing episodes in the history of civilization: in the first compartments, man terrified by the lightning, by a religious superstition, by feudal tyranny, and by the Inquisition; that was the part of the Old World; in the last, Franklin and his kite and Professor Henry of Washington constructing a telegraph apparatus (nothing, by the bye, for Ampère), this was the part of the New World.

\* Issue of October 12, 1895.

Success intoxicates, and this young nation has grown so much within a century that it is excusable in thinking that nothing equals its greatness.

The inventive genius of the American is perhaps a native gift, but it has been unquestionably stimulated by the high rate of wages. For, the entrepreneur seeks to economize human labor the more it costs him. On the other hand, when machinery gives greater productive force to the laborer it is possible to pay him more. An addition of one franc divided among one hundred units of product, only increases the price of the unit one centime. Distributed among ten units, it would increase the price by ten centimes. If one offered to a manufacturer a machine costing 50,000 francs, which replaced four laborers, but which he must amortize in ten years, the manufacturer, in a country where the wages were 2000 francs annually, would not hesitate to buy it, because it would give him a saving of 3000 francs, while the manufacturer in a country where wages were 1000 francs \* would not take it because it would cause him a loss of 1000 francs a year.

There can be no doubt that the machine has rendered production more rapid and more abundant. To demonstrate the advantage of the division of labor, Adam Smith took as an example a small pin factory, and calculated that while a single laborer working alone without machinery, could hardly make twenty in a day, ten laborers, each having a special occupation and combining their labors, manufactured more than 48,000 daily. Mr. Schoenhof, reverting to this illustration, has shown, in a factory of Massachusetts, where seventy machines in operation were tended by three laborers, a machinist and a boy, a production of 25,000 packages containing 7,500,000 pins, inserted in papers and ready

\* The electrical tabulating machine of Mr. Hollerith was employed with economy and success for the Eleventh Census at Washington, where clerks received \$2 and \$2.50 per day. At Vienna and at Rome, where wages are much less, the experiments made were by no means so conclusive in regard to the economy realized.

for sale. One hundred years ago one boasted of making 4800 pins per person; to-day we make 1,500,000.\*

The manufacture of nails, which has a certain analogy with that of pins, may be considered in detail. At the opening of the century they were already made in part by machinery, the Perkins machine having been invented in 1790 and patented in 1795. The laborer set the machine in motion with a foot and one hand, while he held with the other a rod of iron. It produced 200,000 nails a day, but a second operation was necessary for the head. In 1801, twenty-three patents for nail-making had already been granted in the United States. In 1835, there were many more, since mechanical nail-making had been developed and was pushing hand-made nails to the wall. The Perkins machine has been abandoned, because it produced too dearly. The same was true of the Ordione machine, which was succeeded by the Mellville-Otis machine which, in 1879, had yielded to the Reed machine.

But another machine, making nails from wire instead of rods, had made its appearance in 1851. However, the wire nail thus produced did not succeed until after the introduction of the three German machines in 1871, and did not compete with the cut nails until after 1882. In that year also the Bessemer steel began to compete with iron in the manufacture. To-day a laborer, instead of laboriously turning the machine himself, oversees eight machines without fatigue.†

In 1886, steel formed five per cent of the production; to-day it constitutes nearly the entire amount and the

\* "The Economy of High Wages," p. 99.

† Some figures taken from the publications of the American Iron and Steel Association, show the progress and revolution which these inventions have accomplished. The production per kegs of one hundred pounds each, was

Year.	Cut nails.	Wire nails.	Total.
1856 . . . . .	1,824,000	. . . .	1,824,000
1873 . . . . .	4,024,000	. . . .	4,024,000
1886 . . . . .	8,160,000	600,000	8,760,000
1890 . . . . .	5,641,000	3,136,000	8,777,000
1893 . . . . .	3,048,000	5,042,000	8,090,000

quality has improved. If in the last ten years the production has not increased, the price has continued to fall. This fall appears to be enormous if we go back to the period of the Perkins machine. In fact, in 1818, a pound of nails cost from 18 to 37 cents;\* in 1872, 5½ cents, and 1893, 2 cents.†

Mr. Carroll D. Wright furnishes numerous proofs of the productivity of machines.‡ In an agricultural implement factory in the West, 600 laborers produce as much as 2145 before the present machinery. In a gun factory, one man used to make the pieces of one gun a day, and now three men make the parts of 130 guns. Machines save 80 per cent of the labor in the manufacture of women's shoes; 66 per cent in the making of men's shoes. Furthermore, with the McKay machine, a laborer can finish 300 pairs of shoes where he formerly could make five at hand-work. A few years ago, a manufacturer made 500 dozen brooms per week, with seventeen good laborers; he now makes 1200 with nine laborers. A cotton weaver, with the handloom, used sixty to eighty threads a minute; the power-loom uses 180; while the laborer tends from two to ten looms, according to the nature of the product.

Mr. Schoenhof, who also gives many proofs of the productivity of machines, compares the nailmaker of the black country of England, who earns 2s. in fourteen hours, and the nailmaker of Pittsburg, who earns \$5 in ten hours.

"The English nailer," he says, "earns from 10s. to 12s. a week. If helped by a lad the combined earnings do not exceed 16s., of which he must spend 2s. for fuel. The American, who manages three machines, earns with his \$5 a day, \$30 a week, his apprentice \$9; but they produce 2½ tons as compared with the 200 pounds that the Englishman produces, a twentyfold product for tenfold wages; thus the price of a thousand nails is only half as great in America."§

\*Swank, "Iron in All Ages," p. 449.

†A keg (100 lbs.) cost \$5.49 in Chicago in 1872, \$3.15 in 1887 and \$1.49 in 1893. Annual Statistical Report American Iron and Steel Association.

‡"Industrial Evolution of the United States," Part IV.

§"Economy of High Wages," pp. 226 and 398.

The Englishman does not produce nearly so cheaply as the alliance of intellectual and mechanical forces permits the American to do.

To prove that high wages correspond to the low cost of production, Mr. Atkinson relates that a German steamship from Bremen, having suffered severe injuries, was dry-docked at New York for repairs. The owners, when they had received the first statement of charges, frightened by the price of a day's labor, sent orders to suspend all operations. But the orders arriving too late, it was found, when the final account was made, that the total cost was less than it would have been at Bremen.\*

"The pay here is good, but the labor is hard," said an Alsatian blacksmith employed in a large factory. I could verify nearly everywhere the truth of this remark, for I have seen such activity both in the small industry, where the tailors in the sweating-shops in New York worked with feverish rapidity, and in the great industry, where the butchers of the Armour packing house prepared 5800 hogs a day, where the cotton weavers tended as many as eight looms, or where the rolling-mill in Chicago turned out 1000 tons of rails in a day. Everywhere the machine goes very rapidly, and it commands; the workman has to follow. An English manufacturer, having read in one of Mr. Schoenhof's books that a silk spinner of New Jersey had renewed his machinery in order to obtain 7500 turns a minute, instead of 5000, told him that should he establish such machinery in his workshop all his workers would leave him. And, yet, in America, at the present time, the rapidity is from 10,000 to 13,000 turns.†

Even where the machine only plays a secondary rôle it is customary to go quickly and to lose no time, a necessary result of competition. The employer will not tolerate an idle or listless laborer, who causes him loss.

\* "Distribution of Products," p. 61.

† "Economy of High Wages," p. 39.



In the Senate inquiry of 1883, upon education and labor, a weaver of Fall River, who had been a member of the Massachusetts Legislature, and who was then secretary of the Weavers' Union, said that he had worked seventeen years in England, and that conditions were much better than in America. The manufacturers there were not so desirous as they are here of working their men like horses or slaves; they do not work with the extraordinary rapidity which is customary at Fall River. In England, one man manages a pair of looms with two assistants; one between the looms and the other behind. In America, the manufacturer, with one or two exceptions, will not hear of that, and whatever the number of spindles they do not wish that a man shall have more than one assistant. The spindle is turned more rapidly; the laborers have more to do and for each loom Fall River produces more.\*

In the same investigation, a tailor who had been successively miner, farm hand, and tailor in England, and who was secretary of a union at New York, thought the miner better off in England than he was in America, where he was obliged to do much more work in a day. "One can," he said, "say the same of carpenters, bricklayers, and plasterers. For instance, a bricklayer sets in a day about 500 bricks more than at London, Liverpool or Glasgow. I have lived in these cities and I have studied the question. A bricklayer here does more and better than elsewhere. The same is true of the carpenter and the cabinetmaker. In all the branches of industry, the men have to labor harder than in England, and their day is longer." The last statement would no longer be exact in 1893.

The superintendent for a large contractor and builder at St. Cloud, Minn., replied in an investigation by the Bureau of Labor, that workmen in the building trades who had served an apprenticeship in Europe, were slow in their work, even when they knew it well. On the other hand, a foreman stone-

\* "Labor and Capital," 1885, Vol. i, p. 631.

cutter stated that the best laborers were those who had learned the trade in Europe, especially in Scotland, because they commenced their apprenticeship later and continued it longer.\*

Several French laborers, delegates to the Exposition at Chicago, have brought back from their trip the notion that the laborer has to work hard and that he cannot loaf or chatter. "In the machine-shops," said one of them, "there is no movement, no going from place to place on the part of workmen, each one remains at his post without the discipline being more severe than in France."†

A Frenchman, a former student of the School of Art and Trades of Aix, who had worked many years as a machinist in America, gave me his experience on this point:

"The American workman," he said, "is very conscientious, he does not leave his place to talk with his comrades, he is very active and he knows how to use the machine which he handles with intelligence and not with mere routine. Thus, when he makes the cog-wheels, it is not unusual for him to modify the pattern which is before him. In such a case he notifies his foreman, who usually approves it. He enjoys great liberty in regard to the carrying out of his work. If he has invented anything, the employer, as a rule, encourages him (I observed this myself in the box factory connected with the Armour packing house), and oftentimes buys the invention to take out a patent in his own name. Specialty is pushed very far and the same models are frequently used, which facilitates the little inventions of detail, because the attention of the intelligent workman is constantly fixed upon the same object."

The machine does not work like the hand. It has an infinite force and incomparably greater rapidity; it has even a regularity and a precision which the hand and eye rarely attain. But it always does the same thing, and has none of the spontaneity or delicacy of the human mind. It remains for me to cast up the balance of advantage and disadvantage of the machine, and thus of American labor.

For the production of rough work, of the ordinary objects of consumption, of sample pieces, it has great advantages,

\* "Fourth Biennial Report of Bureau of Labor," Minnesota, 1893-94, p. 200.

† "*Rapports de la delegation ouvrière à l'exposition de Chicago*," p. 418.

and in many cases to-day a recognized superiority. For production in great quantities and with great rapidity, American industry is probably better equipped to-day than any other in the world, and I would not attempt to contradict Mr. Schoenhof in his statement that the labor of his country is as cheap in all the important articles that relate to the necessities of life, to clothing and machinery, as the labor of any other nation;\* although manufacturers continued to repeat that it would be impossible for them to struggle against foreign competition if they were not guaranteed by a rampart of customs duties.

Machinery does not give personal character, delicate finish, or the artistic stamp to its labors. That is the weak side of industry in the United States. A French officer, who examined particularly the firearms at the Chicago Exposition, said:

"The Americans do everything well which is done by machine in large quantities; but the finish is lacking, particularly the hand finish which would cost too much; they have in some factories good steel because the ore is good, but in general the steel is inferior to that of Creusot; their ordinary guns are fair and not dearer than in France, but the grooved barrels, which require more skill, are decidedly more expensive."

In machinery, manufacturers generally pay attention to the essential parts without caring to give to the rest the polish which is sought in France. However, there are exceptions, particularly for hand tools, which have forms differentiating them generally from those used in Europe, and which are for the most part, whether of steel or wood, of good quality, light and easily handled, well varnished, of varied forms and well adapted to their purpose. There were fine collections at the Exposition at Chicago, although certain very important factories were not represented.† The French

\* "Economy of High Wages," p. 386.

† The *Frankfurter Zeitung* cites several instances of this labor-saving, noting especially the bricklayer's trowel, which is also used to cut the bricks, and adds "The Americans are as wasteful of material as they are saving of labor and thus the repairing of tools causes them little concern."

laborers who visited the Chicago Exposition noticed everywhere the lack of finish.\* Even in the articles of luxury, they observed that, though Tiffany produced for a certain clientele very richly ornamented jewelry, where there is no attempt to economize style because dearness is a condition of success, he makes also for his ordinary clients cheap articles, which fashioned by mechanical processes, are only moderately artistic. They make the same criticism, and with still greater justification, of ordinary jewelry and imitation jewelry. The artistic bronzes did not satisfy them. They were very commercial and very ugly at the same time, said one; but the manufacture is well understood.† In the exhibit of a large zinc factory, which made cheap clocks, which had stolen and modified French models, they found, "that aside from our models, the rest is bad and only looks to the low price, which is obtained by the large means of production and the facility in the choice of models."‡ They saw pits where in six months leather was tanned by means of certain chemical agents, while fifteen to eighteen months are needed in France, but they doubt the durability of these leathers. I made the same observation for machine-made boots and shoes, and observed that harness was less carefully prepared than in France. They examined pieces of cloths, and found a large number of loops and other defects, coming chiefly from the thread. A French manufacturer commissioned to study the manufacture of hats at the Exposition, expresses himself in like terms, "The American," he said, "in regard to felt hats, imitates the German manufacturer and seeks to produce much and cheaply, rather than well, at the expense of his profits." The manufacturer of shirts says, "the American works for the million and seeks only to produce the article cheaply."

\* They found some products good, as tin-ware, shoes, carriages and common silks; it was chiefly the taste which appeared dubious.

† *Rapports*, etc., p. 239.

‡ *Ibid.*, p. 211.

However, there are exceptions. The shoemaker found the quality of ordinary shoes very satisfactory.

Manufacturers consider the improvement and rapid renewal of the machinery, the rapidly increasing rôle of the machine, and the development of large factories as the legitimate consequences of free competition, and deem it one of the most auspicious, as well as most fruitful forward movements of civilization, to produce much and to produce cheaply. They assert that the manufacturer, the laborer, and the consumer, all three, find it advantageous in the long run.

One must recognize with them that if machines are at the beginning optional, they finish by being obligatory; the better informed hasten to adopt them in order to make profits; the tardy ones decide to employ them in order not to be ruined. Without doubt, it may be disagreeable at times for a manufacturer to have a large capital invested in his plant, and it is painful at the end of a few years to see this machinery out of date and the capital sacrificed.

"So active has been the competition between different mills," according to the Census of 1890, "that only those concerns which have been foremost in the adoption of improved labor-saving machinery are large producers at the present time. The destruction of capital in the steel rail industry during the past decade, by the improvements in mechanical appliances, has been enormous, costly machinery becoming obsolete long before worn out."\*

But if this machinery is out of date, it is because better results are obtained with new machinery. Necessity of frequent change is proof of the rapidity of progress. A cautious manufacturer calculates among his general costs the usage of machinery in a brief period, and if he has calculated properly, he does not worry about a machine placed in the lumber room; it is paid for and has, consequently, rendered the service expected. The individual or nation has the greatest chance of success who knows how to provide him-

\*Eleventh Census "Manufacturing Industries," Part III, p. 413.

self with the best tools and how to use them. A country which wishes to enter into the front ranks of commercial and industrial nations, or to remain there, cannot fall behind in this respect.

The manufacturers judge that the movement has been advantageous to workmen, as sellers of labor, because the level of salaries has been raised, as consumers of products, because they purchase more with the same sum, and as laborers, because their task has become less onerous, the machine doing nearly everything which requires great strength; the workman, instead of bringing his muscles into play, has become an inspector, using his intelligence. He is told that his specialized labor is degrading because monotonous. Is it more monotonous to overlook with the eye for ten hours several automatic looms, and to attach, from time to time, one thread to another with the finger, than to push for fourteen hours against the breast the arm of a hand-loom, pressing at the same time the pedals with the feet?

In proportion as the machines require more room, the ceilings become higher, the workshops larger, the hygienic conditions better. From a sanitary standpoint, there is no comparison between the large factory to-day and the hut of the peasant, or the tenement of the sweating system. The improvement of machinery and the growing power of industrial establishments, have diminished the price of a great number of goods, and this is one of the most laudable forward movements of industry whose object is to satisfy, as well as possible, the needs of man.

The laboring classes do not share this optimism. They reproach the machine with exhausting the physical powers of the laborer; but this can only apply to a very small number of cases to those where the workman is at the same time the motive power, as in certain sewing-machines. They reproach it with demanding such continued attention that it enervates, and of leaving no respite to the laborer,

through the continuity of its movement. This second complaint may be applicable in a much larger number of cases, particularly in the spinning industries and in weaving, where the workman manages more than four looms. They reproach the machine with degrading man by transforming him into a machine, which knows how to make but one movement, and that always the same. They reproach it with diminishing the number of skilled laborers, permitting in many cases the substitution of unskilled workers and lowering the average level of wages. They reproach it with depriving, momentarily at least, every time that an invention modifies the work of the factory, a certain number of workmen of their means of subsistence, thus rendering the condition of all uncertain. They reproach it, finally, with reducing absolutely and permanently the number of persons employed for wages, and thus being indirectly injurious to all wage-earners who make among themselves a more disastrous competition, the more the opportunities for labor are restricted.

In one of the reports of the census of 1880, Mr. Wright examined other accusations which have been brought generally against manufacturing: (1) necessitating the employment of an excessive number of women and children, it tends to destroy the family ties; (2) it is injurious to health; (3) it tends toward intemperance, prodigality, and pauperism; (4) it encourages prostitution and criminality. It was not difficult to prove that these accusations rest upon errors or exaggerations.\*

Quite recently the report of the Commission on the Unemployed of the State of Massachusetts, prepared by Professor Dewey of the Institute of Technology, cited as causes of idleness, the introduction and the improvement of the machine, joined with the specialization of labor and the greater productivity of the laborer which has been the consequence. "We are not agreed," says the writer, "upon the

\*Tenth Census, "Factory System in the United States."

precise extent of the influence of this cause whose effects have varied according to places and occupations." Taking shoemaking as an illustration, he finds in one place a diminution of 15 to 20 per cent, in another from 25 to 30 per cent in the number of the laborers, and he gives in each specialty the number of laborers employed before the invention of the important machines (McKay, Goodyear, etc.), that is a dozen years ago, and to-day; twenty-eight laborers now do the work of forty-four, the diminution is, therefore, about one-third. It would be much greater if the comparison went back fifty years. "Some of the discharged laborers," says Mr. Dewey, "have been re-absorbed by the growth of production, but not all, and the proportion of unemployed increases rapidly and continuously." Mr. Dewey also observes that machinery, which like the Hoe press, does everything and hardly leaves to the laborer more than the duty of furnishing the raw material and of gathering together the finished product, assuredly modifies the composition of the printing office. Fewer laborers are necessary, but they must be intelligent; one skilled man who acts as overseer with a few laborers is enough. It is the same in a factory where the hydraulic hammer has replaced the blacksmith, and in many other industries. A compositor with the machine has not nearly so great a need of a long apprenticeship as the compositor with the hand. It is in calculating according to this substitution of low-priced day labor for skilled workmen, that the labor party seeks to prove that machinery has lowered the average of wages and discouraged apprenticeship.

In the Senate Inquiry of 1883, a tailor spoke with regret of the salaries of 1867, when cutters in New York received twenty to thirty-two dollars a week (he did not remember that they were paid in paper money); they did not gain more than fifteen dollars on the average in 1883. The chairman asked whether the cutting and sewing machines had produced a revolution in the production



of clothing. "That is the case," he replied; "they have suppressed a large part of the work of skilled hands, which was formerly necessary."\*

The Bureau of Labor of New York in 1894 echoed the complaints of workmen who accuse machinery of having diminished the quantity of labor: by 15 per cent, said the carpenters; by 20, said the cutters; 30, shirtmakers; 35, cabinetmakers; 40, compositors, and 50, brownstone cutters. But these workmen appear to have calculated for the labor employed at the same work before and after the invention of the machine, without thinking of the increase of labor, which had been the consequence of the decline in prices, resulting from invention. Some unions, however, observe that machines have increased the number of laborers. Thus, the piano-makers claimed 20 per cent increase. Upon what were these proportions based? The information seems too vague to be conclusive, but it cannot be doubted that in these occupations fewer laborers are necessary than formerly to do the same work.

To these grievances political economy replies by the general results of statistics, which show that the total number of laborers, far from having diminished, has steadily increased from one census to another in the United States; that, on the other hand, the total wages paid to laborers shows an increase of average wages, that the diminution in the price of goods is advantageous to consumers among whom are to be reckoned the wage-earners. These three facts are indisputable.

However, the American laborer is not reassured by such a reply, because he rarely consumes the goods he manufactures, because the average wages of the country is not necessarily the measure of his wages; because when dismissed in consequence of an improvement of machinery, he runs great risk of finding no employment in the same industry, while in another he finds it generally only after long delays; in

\* "Labor and Capital," Vol. i, p. 146.

the meantime, he has a family to support. Although the American is more mobile than the European, the transition is not easy either for one or the other. And on both sides of the Atlantic, there is individual misery and professional crises which touch painfully, very cruelly sometimes, the laboring classes. That fact is not to be disputed.

In general, the people are ignorant of history. If they knew better the experience of the past, they would perhaps be less anxious for the future. During the second half of the nineteenth century, the productive force of industrial machinery and the quantity of products have assuredly increased in a considerable degree, more rapidly than the number of consumers.\* In the middle of the century, machines were denounced as leading to disaster through overproduction. Bastiat endeavored to demonstrate how slight was the foundation for this opinion.

"If the power of machines renders a portion of human labor superfluous for a time, this progress causes anxiety, and is considered disastrous. The specious, but absurd formulas are heard that production is excessive, and we perish from abundance, that productive power has surpassed the power of consumption."

Before Bastiat, Sismondi had insisted at length upon the "glut of commerce," upon "the number of manufactures which bring to the market products which infinitely surpass the purchasing capacity of the public," denouncing the concentration in large factories, and the progress of mechanical appliances as the causes of a disordered overproduction, and affirming that all the laborers of England would be turned into the streets if the manufacturers could employ in their place steam machinery with 5 per cent profit.† But England has to-day infinitely more manufacturers employing infinitely more machines, producing much more than 5 per cent economy in cost compared with that of 1826, and bringing infinitely more products to the market, and yet it has many more laborers, and these receive

\* "*Harmonies économiques*," p. 73.

† "*Nouveaux principes d'économie politique*," 1827, Vol. ii, pp. 326 and 402.

higher wages. As time has proved Bastiat right, and as that promised abundance of 1850 has not prevented our generation from consuming in 1895 a production much more abundant, must we despair of the possibility to produce and consume still more in the coming generation?

What would the copyists of the Middle Ages, who wrote perhaps hardly four pages an hour, have thought if they had been told that the day would come when a machine would produce in an hour the contents of twelve million manuscript pages!\* It is true that copyists have almost entirely disappeared, but it is certain that printing employs many more arms than once copied manuscript, because the people know how to read.

The chief of the Labor Bureau of New York has made a suggestive comparison: the United States and Great Britain, he says, are the countries which own and use the most machines. Compare the general condition of laborers in those countries with that of any country whatever in the world, where machines are unknown, except in the most primitive forms. Where is the superiority? It is almost a paradox, and yet it is a truth that machines bring about a much larger employment and improvement, not only because they increase production, but because they multiply the chances of employment, and incidentally the consumption of products. In fact, the census of the United States shows that the proportion of laborers to the total number of inhabitants has increased in the same period that the machine has taken most complete possession of manufactures. From 1860 to 1890, while the population of the United States doubled, the number of persons employed in industry increased nearly threefold (increase of 172 per cent), and at the same time the mechanical power, measured by horsepower, increased fourfold.† Inventions have created new

\* Eighth Annual Report, Bureau of Labor, New York, p. 685.

† In England the number of horse-power has increased from 1,290,000 in 1850 to about 9,500,000 in 1890; still population has increased from 27.7 millions to 38.1 millions. In France population was 34.2 millions in 1841 and 38.3 millions in 1896;

industries, such as photography, electricity, telegraphy, electrotyping, railroading, manufacture of bicycles, etc., and have thus given to labor much more employment than they have withdrawn from it. Thus, even in old industries, transformed by machinery, the progress of consumption has generally maintained a demand for hands.

This progress has not been made at once by regular and simultaneous development of all the branches of production; there have been general and special crises. Each branch has, as it were, its history; there are some which languish and there are some which decay, but it is by the entire tree that one must judge the growth. What the chief of the Bureau of Labor of New York says concerning Great Britain and the United States, is proved by statistics for all the great industrial regions; thus, in France, where the population increases very little, it grows rapidly in those departments which have the greatest number of steam engines, because machinery creates a demand and attracts hands.

There is no social evolution which does not produce friction. That which urges industry toward machinery and large factories appears to me to-day irresistible, because it leads to cheapness, which the consumer seeks first of all, and which is one of the objects of economic civilization. It is Utopia to believe that the world could come back by some modification of the social order, or of mechanical motive powers to the system of the little family workshop. Such a workshop is far from being an ideal, as the sweating system proves.

horse-power employed in industry was 56,000 in 1840 and 5,734,000 in 1890. The figures are hardly comparable because the statistical methods have changed, but they prove that the progress of motive power representing more than 100 millions man power has not interfered with the increase in the number of laborers in a country whose population is reputed to be stationary. From 1836 to 1891 population increased more than sixty-four millions in the fourteen departments which have the largest number of machines and which are also those which have increased most rapidly, while population has somewhat diminished since 1836 in the fourteen departments which have the smallest number of machines.

A Frenchman in Philadelphia, who is familiar with economic interests, said that, when one examines attentively the condition of affairs in America one is struck by the rapid development of large industry and its concentration. "The future is there." I agree with him, although convinced that the aggrandizement of manufactures has its natural limits, and that on the other hand there will always be a large place for small producers and small traders.

The industry of the United States since the Civil War has advanced resolutely and rapidly in that path, and has become very powerful. "It moves with great strides," said a French manufacturer in a report upon the Exposition at Chicago, "and in many points it is superior to ours, not from a scientific, but from a practical point of view." It will be concentrated still more, and the machine whose rôle will not cease to grow, will continually push it forward. It is, therefore, towards concentration and improved machinery that entrepreneurs, wage-earners and economists should turn their eyes to perceive the future. If one desires to try practical reforms, one must frankly accept, at the outset, a fact which one cannot prevent, and which has its reason for existence, which it would be regrettable from more than one point of view, to impede by the artificial measures of legislation.

E. LEVASSEUR.

*Paris.*